Mediated Communication and Customer Service Experiences: Psychological and Demographic Predictors of User Evaluations in the United States

Kate K. Mays
Boston University
kkmays@bu.edu

James E. Katz
Boston University
katz2020@bu.edu

Jacob Groshek
Kansas State University
groshek@ksu.edu

Abstract

People around the world who seek to interact with large organizations increasingly find they must do so via mediated and automated communication. Organizations often deploy both mediated and automated platforms, such as instant messaging and interactive voice response systems (IVRs), for efficiency and cost-savings. Customer and client responses to these systems range from delight to frustration. To better understand the factors affecting people's satisfaction with these systems, we conducted a generally representative U.S. national survey (N = 1321). Here, we found that people still overwhelmingly like and trust in-person customer service over mediated and automated modalities. As to demographic attitude predictors, age was important (older respondents liked mediated systems less), but income and education were not strong attitude predictors. For personality variables, innovativeness was positively associated with mediated system satisfaction. But communication apprehensiveness, which we expected to be related to satisfaction, was not. We conclude by discussing implications for the burgeoning field of human-machine communication, as well as social policy, equity, and the pullulating digital services divide.

1. Introduction

Over two decades ago, Katz, Aspden, and Reich [1] investigated the phenomenon of electronic voice messaging systems, then referred to as VRUs (voice response units). It was a technology emerging predominantly in corporations' customer service arms aiming to cut costs and boost efficiency. Despite VRUs' promise, customers themselves were generally unenthusiastic about the new technology and found it unproductive and frustrating.

In the time since, automated services like Interactive Voice Response systems (IVRs) and chatbots have continued to be hailed as cost- and time-savers for companies' customer service operations [2]. For rote inquiries that can be more easily standardized, IVRs have been used to supplement or even replace paid employees in receptionist or customer service roles. IVRs can re-direct calls to the appropriate departments, schedule appointments, refill prescriptions, provide account information, among many other information, coordination and communication-oriented tasks.

If one googles "IVR customer service uses," a plethora of results pop up with optimistic prognostications of improved customer satisfaction and more efficiency for both the customer and the company from an error-free, streamlined process that can handle a high volume of calls, ultimately increasing productivity and profits for the company.

However, the customer service provider Startek found in 2017 that 85% of respondents to its survey preferred interacting with humans over automated agents like IVRs or chatbot/AI platforms, with exceptions for basic inquiries like checking one's account balance. These preferences seemed to be driven by people's desire for empathy in a customer service interaction [3]: with human empathy on the other side, there's a chance that rigid process may by eased, context considered, and therefore exceptions made for a person's particular situation.

It has been argued that people's frustration with IVRs derives from the lack of power they have in these interactions; in effect they become supplicants required to interact with a non-human, unintelligent entity. Thus IVRs seem to act primarily as "gatekeepers to information" [4], requiring the customer to perform a number of steps and fulfill certain requests before they can get the help they initially sought. As such, customers are "faced with a dilemma; they need help from the institutions but dislike IVR interactions, yet despite their dislike, they are routinely forced to engage with the system to

URI: https://hdl.handle.net/10125/64079
978-0-9981331-3-3

achieve their desired ends" [4]. In their qualitative exploration of people's experiences with and perceptions of IVR, Walsh and colleagues found that their participants had a range of strategies to "work with" or, with more experience, "circumvent" the IVR technology [4].

Their participants' acquiescence and subsequent circumvention strategies to effectively navigate IVRs suggests what seems clear from industry trends: IVR and other AI-enabled automated systems are not going away. Rather, the ways for people to access information and resources are proliferating, and for some this is revolutionizing their lives. Accessing information now with technology is not simply learning the weather forecast but actual problem-solving to navigate through daily life. Further, technology is vastly different from the simpler search interfaces and electronic messaging systems that predated our automated age. These information systems no longer only convey messages between people as mediators, but in some instances act as communication partners themselves, which may require a reconceptualization of communication technologies beyond the computer-mediated communication (CMC) paradigm [5]. This new age of Artificially Intelligent (AI) communication devices compels us to think about human communication beyond face-to-face and mediated modalities, and think about human-machine communication [6] [7].

The fact is that in the coming decades, vast amounts of our lives will be run algorithmically, with humans' voices serving as a major machine interface. Increasingly sophisticated computers and interfaces will address an array of human needs through automatic services. However, experience shows that, even after years of iteration, these services are far from flawless; seemingly people will continue to need customized interventions to address specific situations and problems. Too, research shows that people are (understandably) hesitant to turn over important decisions to "faceless" computers.

While these trends concerning IVRs are occurring worldwide, in this study we look at the US as a bellwether to see how people are doing now by comparing how people perceive different modalities for accessing information to solve problems in support of their personal needs. Through a nationally representative survey, we compared and contrasted perceptions of these services' utility as modeled through individual-level variables such as communication apprehension, innovativeness, and experience with them. Given the encroaching ubiquity of these services in our lives, the implications of our findings are relevant to systems designers, social scientists, and people concerned about social policy and equity.

2. Literature review

There are existing models that explain part of people's approach toward new technologies in terms of acceptance, such as through models like the "Technology Acceptance Model" (TAM) and "Technology Readiness" (TR). These models are helpful in parsing how people's particular perceptions of a specific technology (e.g., how easy it is to use and their intentions to use it) inform their actual use of the technology, and the amount of variance they are able to explain demonstrates their utility in predicting whether or not people will use a technology based on how they perceive it. However, for this study we are interested in understanding individual, trait-based correlates of attitudes about different modalities of customer service, one of which is in-person and the other two are technology based.

2.1. Media richness

Modality is important to consider because communication channels have different affordances that influence perception and use. Media richness theory asserts that the more cues a communication channel has, the more it is able to reduce uncertainty and ambiguity [8]. It originally was proposed to explain the effects of different types of media on task performance, and was subsequently applied to new media that emerged in the 1990s and beyond, as the types of communication channels expanded with online and digital platforms. Research focused on communication channels' different attributes and the extent to which they could transmit types of information. Media richness theory's core proposition was that the more information and content dimensions a medium provided – the "richer" a medium was – the more satisfying and effective that medium will be perceived [9]. In other terms, different channels provide varying amounts of social presence, a critical lubricant for interpersonal communication [10]. Face-to-face interaction would be considered the "richest" way to communicate because it can transmit verbal and nonverbal cues in numerous ways (e.g., haptically, visually, aurally), which mitigates misunderstandings [10] [11]. Following face-to-face, telephone (audio) is the next highest in communication richness, followed by electronic and written forms of communication [11] [12].

Customer service now plays out across a spectrum of communication channels. There is still face-to-face or "in-person" customer service, whereby someone interacts with another person, and then there are varying degrees of mediated customer service: over e-mail, social media platforms, and instant messaging chats. In these exchanges, another person is at the other end of the interaction, but the communication is less rich because of the limited visual/audio cues and, in some cases, less instantaneous feedback. IVRs are distinct from computer-mediated communication (CMC) in that they are not computer systems passing information between two people, but rather are secondary communication entities in exchanges. In some cases, IVRs are a communicative gatekeeper prior to an eventual person-to-person exchange, such as when IVRs serve to direct inquiries to appropriate departments [13].

Because it uses voice to relay information, IVRs traditionally would be considered a "richer" medium than CMC, which only relies on text. Indeed, when comparing digital customer service channels (text, audio-only, and video), satisfaction corresponded with the digital channel's level of richness [14]. Therefore, one might expect that automated customer service channels like IVR would be preferred over mediated customer service. However, media richness also takes into account how personal or impersonal the communication source is [11]. To our knowledge, this aspect of media richness has not been explored with regards to automated technology that can simulate human-ness but is clearly automated.

Indeed, scholars have argued that traditional communication theories predicated on human-human interaction may not directly apply to human-machine communication (HMC) [5] [7]. Media richness theory was developed at the early stages of the online communication revolution. Since then, alternative theories emerged to explain how and why people seemed to be using online interfaces to form relationships and interact socially [15]. For example, social information processing (SIP) theory contends that, given enough time, people can communicate just as intimately and effectively through online means because people will adapt to the medium [16] [17].

With the addition of automated interfaces, though, it is not clear, whether the same tenets of media richness apply when people are talking *with* machines, rather than *through* them to a human on the other side [7]. Increasingly, people are interacting with AI technologies – such as IVRs in a service setting or digital voice assistants like Alexa in a domestic setting – through the course of their daily lives [18]. Yet, people's baseline expectations for robot interactions, as an example of another AI entity, were found to be lower in terms of anticipated liking, uncertainty, and social presence [19]. These findings were consistent in a follow-up study that also showed participants an image of a mechanistic robot interactant [20]. However, a third study showed that when the robot appeared more human, uncertainty decreased and expectations for social presence increased [21]. Putting these results together, the researchers have proposed an "anthropocentric expectancy bias" for communication that might explain why people are much less comfortable with the abstract idea or mechanistic image of a robot, as compared with a more human-looking robot interactant.

Further, it has been a few decades since these theories were formulated, and in that time people have continued to use and innovate online and other digital platforms; some now have had lifelong acquaintanceship with these technologies. Presumably there has been a great deal of acclimation and learning taking place, wherein these technologies are less foreign as people have mastered them. Context may matter, also. For example, in existing business-to-business relationships, electronic media could be modeled as a similarly rich media to telephone and face-to-face communication [12] and within organizations, different tasks are more conducive for richer or leaner media depending on the nature of the task [22]. We therefore ask the following research question about how attitudes towards customer services may differ.

RQ1: Are there differences in attitudes toward customer service modalities that vary in their media richness?

2.2. Individual traits

Media richness primarily focuses on how the channel's attributes affect perception and use. It is also important to consider the ways in which individual characteristics may influence perception and usage. It may be that the richness of a medium is not fixed with a uniform effect, but rather that people may differ in their perceptions of a medium's richness - and thus their satisfaction with the medium - based on personal traits and past experiences [23]. Previous research has shown that experience with certain technologies improves people's attitudes [24] [1] and reduces their anxiety about using them [25].

Communication apprehension has been linked to more computer anxiety generally [26]. When comparing videoconferencing and face-to-face meetings, people higher in communication

apprehension liked the mediated meeting format less, which was explained potentially by their heightened self-awareness and anxiety about losing face in front of their peers [10]. However, these apprehensive individuals regarded the technology more positively after regular use. In newer media contexts, individuals with higher communication apprehension in a CMC context were less motivated to use Facebook for interpersonal communication, which was related to less use of Facebook's interactive features [27].

Innovativeness was originally conceptualized as a personality trait that indicated one's willingness to change [28]. It has since been identified as a persistent trait that corresponds with openness to and adoption of new technologies [29]. Rogers included individual innovativeness in his model for diffusion of innovations, and created an "innovator" category of adopters who outpace the rest in terms of openness to new things [30]. The research on how individual innovativeness relates to technological acceptance and adoption is mixed, however. Individual innovativeness has been found to be a significant predictor of intended technological use [29], and more innovative teachers, for example, were more likely to use computers in their classroom [31]. In a different study, though, domain-specific innovativeness was more likely to predict product adoption as compared to innate innovativeness, which appeared to have no effect [32]. Looking at more sustained use, beyond initial adoption, innovativeness may not have as much of an influence [33]. Given the mixed findings on how personality influences technology acceptance and adoption, we pose the following research question.

RQ2: To what extent do people's a) experience, b) communication apprehension, and c) innovativeness influence their perceptions of different customer service modalities?

3. Method

In early fall 2015 we conducted a nationally representative survey (along four demographic categories—age, gender, education, and ethnicity, N = 1321) of American respondents that probed their recent customer service experiences and their general opinions about different customer service modalities (e.g., in-person, mediated channels like e-mail and social media, as well as and automated services like IVR and chatbots for customer service). To the maximum feasible extent, in all regards we attended to the standard best practices for surveys set forth by the American Association for Public Opinion Research (AAPOR) [34]. The survey was administered as an online questionnaire through the professional survey company Qualtrics, which recruits American adults for compensation to participate in surveys. Our sample had an average age of 29.36 (SD = 16.33) and was 51% female. Respondents were predominantly white/Caucasian (68%); 66.5% had at least some college through a 4-year degree; and 87% had an annual household income of less than $100,000.

3.1. Attitudes about customer service across modalities

We measured customer service attitudes with an index that asked for general opinions of different types of customer service (in-person; telephone with a person; e-mail; social media; instant messaging; IVR; virtual assistant; live chat) on a 4-point Likert-type scale ("miserable," "unsatisfactory," "satisfactory," "excellent," system-missing = "never used / don't know what it is"), as well as level of trust in each modality, also on a 4-point Likert-type scale ("none," "a little," "some," "a lot," system-missing = "never used / don't know what it is"). We combined these items to create scales for three different modalities by averaging together the opinion and trust items. Here, it is important to point out that the usage reported for each modality is specific to uses related to customer service, and not media use more generally (such as social media or virtual assistants that may have been used more frequently in other contexts).

In-person customer service included both a live person over the phone and an in-person interaction (4 items, a = .815). The most amount of respondents (n = 1196) provided their assessment of this modality; only about 8% of the sample responded that they didn't know or had never used it (M = 3.42, SD = .58).

Mediated customer service combined attitudes about customer service via e-mail, instant chat, or social media (6 items, a = .829). This modality appeared to be the least well known, as almost 39% of respondents (n = 695) had never used or didn't know about social media customer service (M = 2.69, SD = .65) Opinion and trust - mediated platforms (email, chat, social media)

Automated customer service encompassed IVR and virtual assistant technologies, as well as instant chat with an automated computer agent like a chatbot (6 items, a = .884). About 37% of respondents (n = 709) had never used or didn't know about virtual assistant customer service (M = 2.46, SD = .79)

3.2. Predictors of attitudes

3.2.1. Experience. Past research [1] [23] has shown that people's past experiences with customer service technology can inform their general perceptions and attitudes about the technology. Therefore, we included three measures that asked respondents about: 1) how recent their last customer service experience was (7-point scale, Never - within the last week); 2) how they would rate that experience (4-point scale, Miserable - Excellent); and 3) how likely they would be to continue using the company and recommend it to a friend (3 items, 5-point scale "very unlikely" to "very likely", a = .852). It is important to note that 88.4% of respondents (n = 1168) reported their most recent customer service experience as having been either a mediated or automated interaction.

3.2.2. Individual traits. The communication apprehension index was adapted from McCroskey's "Personal Report of Communication Apprehension" scale [35]. The five-point ("strongly disagree" to "strongly agree"), four-item scale (a=.800) included statements such as: "Generally, I am comfortable while participating in group discussions.", "Communicating at meetings usually makes me uncomfortable" (reverse coded). Items were coded such that a higher score on the communication apprehension index indicated less apprehension, i.e. more comfort communicating (M=3.44, SD= .96).

The measure for innovativeness was adapted from Hurt, Joseph, and Cook [28]. It is a five-point ("strongly disagree" to "strongly agree") five-item Likert-type scale (a = .729) that included statements such as: "I enjoy trying new ideas" and "I often find myself skeptical of new ideas" (reverse-coded). Items were coded such that a higher score indicated higher innovativeness (M = 3.69, SD = .65).

Age, gender, education, and income were also included as controls in the models, given prior research showing to varying degrees that these characteristics influence attitudes towards technology [1].

3.3. Analysis

All analyses were conducted using IBM SPSS Statistics. We first ran frequencies and first-order analyses to get a picture of the data and relationships between variables. Then we constructed hierarchical linear regression models to evaluate predictors of respondents' attitudes towards the three different customer service modalities.

4. Results

Respondents' general opinions and levels of trust in the different modalities for customer service are reported in Figures 1 and 2. As can be seen, in-person customer service is still vastly preferred over the mediated and automated options. Over 80% of respondents were at least satisfied with in-person interactions; in comparison, roughly 60% of respondents were at least satisfied with e-mail or instant chat interactions, and only 30 - 40% of respondents were at least satisfied with automated customer service. These proportions are similar for those who have at least "some" level of trust in the various customer service modalities.

As these descriptives might suggest, there were significant differences between each measure of customer service perception, with the biggest difference in means between in-person customer service and automated customer service (paired t(696) = 29.13, p < .001). There was the smallest difference between mediated and automated customer service (paired t(578) = 7.62, p < .001). Indeed, mediated and automated customer service attitudes

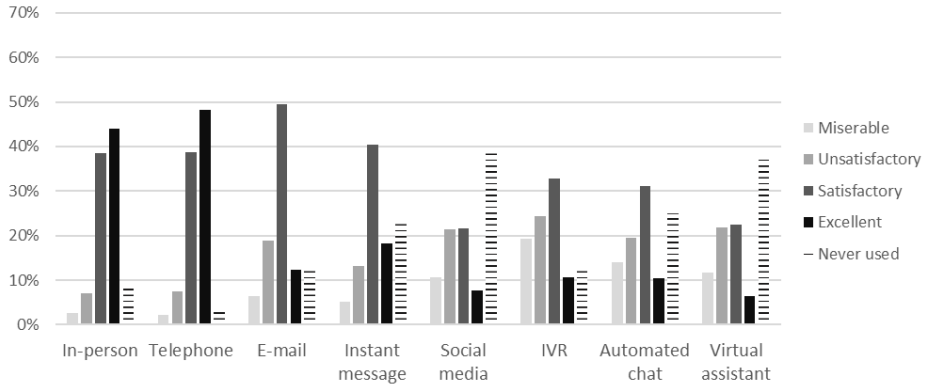

Figure 1. General opinion of customer service modalities

were relatively strongly correlated with one another (Spearman's rho = 0.69, $p < .001$).

Interestingly, though in-person customer service is highly preferred, only 5% of respondents (n=65) had an in-person interaction as their last customer service experience. In this respect, automated services seem to be winning out: 58% of respondents (n=759) had some kind of automated interaction as their last customer service experience, while 31% of respondents (n=409) had some kind of mediated interaction as their last customer service experience.

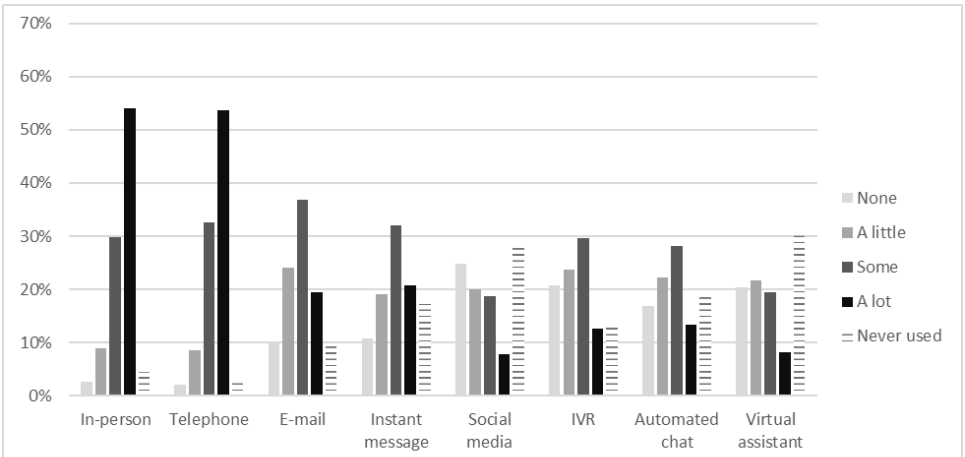

Figure 2. Trust in customer service modalities

4.1. Relationships between customer service attitudes, experience, and individual traits

There were significant and positive correlations between respondents' satisfaction with their most recent customer service experience and their attitudes of in-person customer service ($r_s = .240$, $p < .001$), mediated customer service ($r_s = .384$, $p < .001$), and automated customer service (Spearman's rho = .340, $p < .001$). Correlations were still positive but weaker between respondents' recency with customer service and their attitudes of in-person customer service ($r_s = .086$, $p < .05$) and mediated customer service ($r_s = .087$, $p < .05$).

For the two major trait variables - communication apprehension and innovativeness - bivariate correlations were calculated. Communication apprehension was only significantly correlated with in-person customer service interactions ($r_s = .168$, $p < .001$), such that those who had less communication apprehension also had more positive attitudes towards in-person customer service. Innovativeness was positively correlated with all three customer service interaction types: it was most strongly correlated with in-person customer service ($r_s = .220$, $p < .001$), followed by mediated customer service ($r_s = .192$, $p < .001$) and then automated customer service ($r_s = .139$, $p < .001$).

There was a negative correlation between age and attitudes on mediated ($r = -.244$, $p < .001$) and automated ($r = -.207$, $p < .001$) interactions with customer service: the older someone was the more negatively they perceived these two types of interactions. There was no significant correlation between age and in-person customer service interactions. Further, there was no significant difference among age groups on attitudes of in-person customer service. For mediated ($F(3)=6.84$, $p < .001$) and automated ($F(3)=6.19$, $p < .001$) customer service, though, a clear pattern emerged: There were no significant differences between those aged 18-24 (mediated M=2.81; automated M=2.57) and 25-44 (mediated M=2.81; automated M=2.62); however, there were significant differences between the 45-64 year-old group (mediated M=2.56; automated M=2.35) and everyone else as well as the 65+ year-old group (mediated M=2.29; automated M=2.11) and everyone else, with the oldest group holding the lowest positive attitude of both mediated and automated customer service. Age was also negatively correlated with innovativeness ($r = -.189$, $p < .001$) and correlated with less communication apprehension ($r = .124$, $p < .001$). No significant differences were found between men and women's attitudes on any of the three types of customer service interactions.

4.2. Modeling customer service attitudes across modalities

Based on the first-order analyses reported above, we constructed a series of hierarchical OLS regressions for each of the customer service modalities. To reiterate, the dependent variables for each of these modalities (in-person, mediated, and automated) customer service experiences were summarized indexed based on 4-point Likert scales as described in section 3.1 previously.

Each of these models contained three blocks: (1) demographic characteristics (age, gender, education,

income); (2) individual traits (communication apprehension and innovativeness); and (3) recent customer service experience. With the exception of the demographics block in the in-person customer service model, all blocks in the three models were significant at $p < .001$.

As can be seen in Table 1, the differences were most distinct between in-person customer service and the other two modalities. The predictors explained the most variance for mediated customer service (23.7%), followed closely by automated customer service (19.0%); only 11% of the variance in in-person customer service was explained by the included variables.

For attitudes toward in-person customer service, innovativeness ($\beta = .163$, $p < .001$) and satisfaction with one's most recent experience with customer service ($\beta = .196$, $p < .001$) were the strongest positive predictors. Age was also significant – the older someone was the more positively disposed they were to in-person customer service ($\beta = .082$, $p < .001$). This pattern is reversed for mediated and automated customer service: age was negatively correlated with attitudes toward mediated ($\beta = -.226$, $p < .001$) and automated ($\beta = -.199$, $p < .001$) modalities.

Personality traits contributed the least amount of explanation towards attitudes of mediated and automated customer service, and of these, innovativeness was the only significant predictor of positive attitudes towards mediated ($\beta = .133$, $p < .001$) and automated ($\beta = .109$, $p < .001$) modalities. Satisfaction with and loyalty to a company based on the most recent customer service interaction had a nearly identical influence and positively predicted attitudes, explaining 13.8% and 12.5% of the variance in mediated and automated customer service, respectively.

Table 1. Predictors of attitudes towards different customer service modalities

	In-person		**Mediated**		**Automated**	
	B (SE)	β	*B (SE)*	β	*B (SE)*	β
Constant	2.172		1.417		1.638	
Age	.003 (.001)	.082***	-.010 (.002)	-.226***	-.010 (.002)	-.199***
Gender (1 = male, 2 = female)	.024 (.033)	.021	-.077 (.047)	-.059	-.169 (.056)	-.109***
Income	-.002 (.018)	-.004	-.008 (.026)	-.012	-.029 (.030)	-.036
Education	-.029 (.013)	-.069*	.032 (.019)	.066)	.030 (.022)	.052
R^2 change	**.4%**		**7.8%*** **		**5.6%*** **	
Communication apprehension	.038 (.020)	.062†	-.026 (.031)	-.031	-.007 (.036)	-.008
Innovativeness	.150 (.031)	.163***	.146 (.046)	.133***	.141 (.054)	.109**
R^2 change	**5.0%*** **		**3.1%*** **		**2.0%*** **	
Recent customer service interaction	.010 (.010)	.029	.020 (.014)	.052	-.017 (.017)	-.037
Recent customer service satisfaction	.142 (.030)	.196***	.173 (.044)	.209***	.193 (.053)	.193***
Recent customer service loyalty	.039 (.024)	.067	.121 (.035)	.188***	.147 (.042)	.188***
R^2 change	**6.2%*** **		**13.8%*** **		**12.5%*** **	
Total adjusted R^2	*11.0%*		*23.7%*		*19.0%*	

***Note*: *B* (SE) = unstandardized regression coefficient with the standard error presented in parentheses; β = standardized regression coefficient**

†$p < .10$, *$p < .05$, **$p < .01$, ***$p < .001$

5. Discussion

Information today is communicated through myriad channels. As ever more AI-enabled technology has emerged, communication occurs not only with other humans through technology, but also with the technology itself. Access to and competence with technology remain important considerations for social equity and progress. To that end, this study examined attitudes towards different technologies in a customer service context. As companies attempt to cut costs and improve performance, they have turned to automated systems like IVR to offload customer service tasks. Through a U.S. national survey, we compared attitudes about different customer service modalities that ranged in their levels of "richness": in-person (face-to-face or over the phone), mediated

(e-mail, social media, instant messaging), and automated (IVR, virtual assistant, chatbot).

We found that people still overwhelmingly like and trust in-person customer service over mediated and automated modalities. This finding aligns with the main proposition of media richness, which is that the number of cues a channel has corresponds with its ability to convey information, and cue-heavy channels are preferred over those lighter on cues. One limitation to our approach is that we did not ask for perceptions of richness from respondents; rather, we categorized the channels based on their similarity of features.

Of course our study was also limited by the short-comings of survey methodologies and attitude measurement, the defects of which are well rehearsed in the literature. Additionally, we recruited respondents through a professional survey company, and it was administered online. While the sample's demographic distribution matched that of the United States, there may be other characteristics that mitigate the ultimate representativeness of the sample – and thus generalizability of the survey's findings. As to the time dimension, this survey was conducted in late 2015. While some technologies have been subsequently modified, we believe the findings of the correlates should still be of value. One reason for this belief is that general data concerning these relationships have been largely unavailable and, in the case of our findings, are presented here for the first time. Secondly, many of the relationships we detected are likely to be quite stable, similar to the cases of other mediated technologies. Finally, the information presented here has broader applicability given that mediated communication technology interfaces are becoming more common worldwide, especially in the developing world, and therefore is worthy of dissemination.

Interestingly, mediated customer service was preferred slightly more than automated services such as IVR, even though mediated channels technically have fewer cues than IVR (e.g., text only). It seems, therefore, that the automated aspect of IVR-type technology is a crucial component of people's attitudes. This follows what a qualitative investigation of attitudes on IVR found in terms of people's frustration with automated customer service and their belief that interacting with a human was bound to result in more favorable outcomes.

This finding may be further explained by what HMC scholars have termed an "anthropocentric expectancy bias" that is violated when people have to interact with a machine instead of a human [19] [20] [21]. Researchers have suggested that AI should be treated as a unique kind of communicator that does not parallel human communication [7]. Indeed, some have argued that communication research moving further into the 21st century must adapt or develop new theoretical paradigms to understand technology not only as a neutral medium that conveys information, but that serves as an "information source or receiver" [5]. Specifically, AI-driven technology challenges the dominant CMC conceptualization of technology primarily as a tool to facilitate human-to-human communication. It may be this instrumentalist perception of technology in particular that frustrates people in the especially transactional environment of customer service.

Further, the findings suggest, as HMC scholars have argued, that it may not be appropriate to directly compare automated machine communication with human-human communication, with the assumption that human communication is always the "gold standard" [6]. While the results in this study bear that out (participants vastly preferred human-human communication, either in person or mediated, over automated communication), this comparison is perhaps not the most productive to make for better understanding HMC. We do not necessarily need to throw out CMC theories, but should be careful when building on them to not just consider automated technology as yet another iteration of a mediated modality [5]. The findings provide support for these researchers' argument that HMC should be conceptualized alongside but apart from the existing CMC paradigm, rather than only from within it.

It makes sense, too, that recent customer service experience was most strongly related to positive attitudes, aligning with research that has shown that positive prior experiences with technology results in more positive attitudes towards the technology [1]. Over 90% of our sample had most recently accessed customer service through mediated and automated means. While it would have been ideal to split out these samples based on these experiences and make comparisons, we kept them grouped together to retain our models' statistical power.

In terms of individual characteristics, we found that innovativeness was positively related to attitudes across all three customer service modalities. And while one can only speculate as to why this characteristic persisted not just with mediated and automated modalities but also with in-person experiences, it could simply be that those individuals were more willing to work to find acceptable solutions, regardless the interface. Alternatively, higher education levels were negatively related to in-person customer service but neither of the other modalities, which may potentially imply a certain power distance between more educated customers

and service representatives. To speculate, it might be that non-human modalities are seen by customers as class-neutral or emotionally neutral, thus not invoking threats to the customer's self-image or feelings of deference. If this finding is borne out, it presents an area teeming with implications.

Communication apprehension had no major effect, though it was weakly correlated with in-person customer service (e.g., those who were less apprehensive held more positive attitudes towards in-person customer service). Not surprisingly, age was negatively correlated with attitudes towards both kinds of customer service technologies. Future studies might look further into what other personal traits contribute to perceptions of automated technologies, which could then inform better individual customization of such technologies.

As automated technology proliferates further into our lives, much in the same way that digital technology has in the last quarter century, it will be important to understand how this modality enables and hinders people's individual effectiveness and satisfaction, as well as their socio-economic prospects. A digital information divide may widen further to encompass a digital services divide. This study constitutes a first step in understanding better factors that may contribute the prevention or amelioration of problems related to service access as technologies of personal power continue to develop and proliferate.

Frequently theory is built without reference to any systematic data and instead relies on examples. Having both independent empirical support from a statistically representative population is a valued addition in the conceptual development in a new area such as HMC, as set forth by others [5] [6] [7]. Although the results have yet to be independently confirmed, they suggest an exciting data-supported development that may prove to be fruitful. This is particularly true with the dimension of power dynamics and other traditional sociological concerns like class, ethnicity, and gender.

In this light, therefore, it is important to understand people's perceptions and reactions to these kinds of services. Although we do not know what the realities of this world will be, having early indications of what voice versus other input modalities in the contemporary world is one of the best avenues of gaining insight into, and preparing for, this agent-driven world.

6. References

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